CONCEPTS NREC

CONCEPTS NREC CAPABILITY STATEMENT
AGILE ENGINEERING FOR FUTURE COMBAT SYSTEM TURBOMACHINERY

Whether for high performance gas turbines, or for high boost turbochargers for lightweight diesel engines, Concepts NREC is interested in participating in the development of the Future Combat System. While we are not a traditional defense contractor, Concepts NREC provides this one-page capability statement reflecting our interest in potential teaming arrangements with interested defense contractors.

Concepts NREC is the world's leading independent turbomachinery design house, serving not only the turbocharger industry but also other industries from fuel cells and refrigeration systems to gas turbine engines and rocket turbopumps. We offer not only design services but also design systems – software for aerodynamic and mechanical design of advanced technology rotating components.

Figure 1. Flight rated T-64 Engine Driven Compressor designed and built by Concepts NREC.

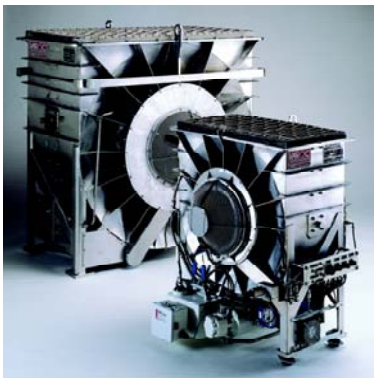

Figure 2. VAROC air dynamometers, widely used for military and commercial testing of helicopter turboshaft engines, designed and built by Concepts NREC.

We deliver a variety of advanced technology hardware products. Examples include:
1) an engine-mounted compressor, Figure 1, which mounts on a T-64 turboprop and provides cabin-cooling air for man-rated aircraft, and 2) the VAROC air dynamometers, Figure 2, that is used by both the US military and commercial customers to load test most of the world's gas turbine helicopter engines.

Our internal and contracted design of turbomachinery products is aided by the advent of the Agile Engineering Design System®, tools which permit extensive optimization in a short period of time. This facilitates design of well-engineered, competitive product. Diverse design functions are included today in the Agile Engineering Design System®, cycle calculations, preliminary design optimization (PDO), Design for Manufacturing and Assembly (DFMA)®, meanline performance modeling, sophisticated three-dimensional blade design with appropriate rapid flow calculations, finite element stress analysis (FEA), 3D viscous flow analysis (Computational Fluid Dynamic - CFD), rotor dynamics, NC machining and precision casting methods, plus the CAD (computer-aided design) layout of the final products. Additionally, a variety of laboratory test protocols, including the virtual laboratory, and the final process of validation and data synthesis are all readily available today with sophisticated, highly interconnected design tools. These assets provide an excellent foundation for truly competitive engineered products. Our design suite, shown for centrifugal compressors and axial turbines in Figure 3 and 4 respectively, provides leading edge designs, whether for advanced turbomachinery, whether for gas turbines or for high pressure ratio, wide range turbochargers.

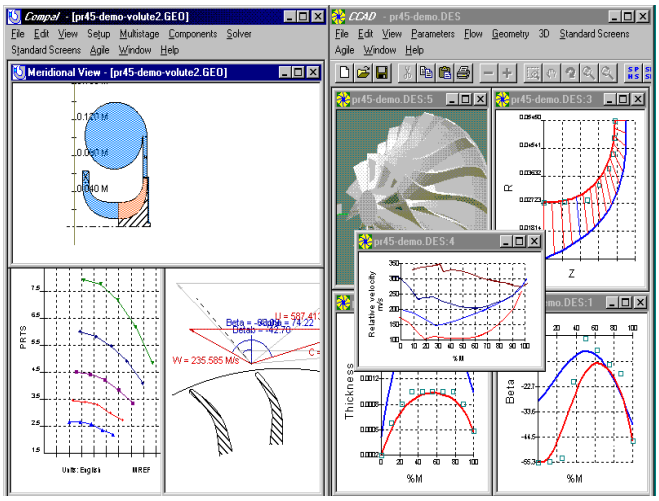

Figure 3. Concepts NREC's modern compressor Agile Engineering Design Suite. Meanline calculations and rotor geometry with real time quasi-3D through-flow calculations are shown. OLE connectivity permits seamless information transfer between functions and also links CFD and FEA into the same seamless agile interface with fast solutions.

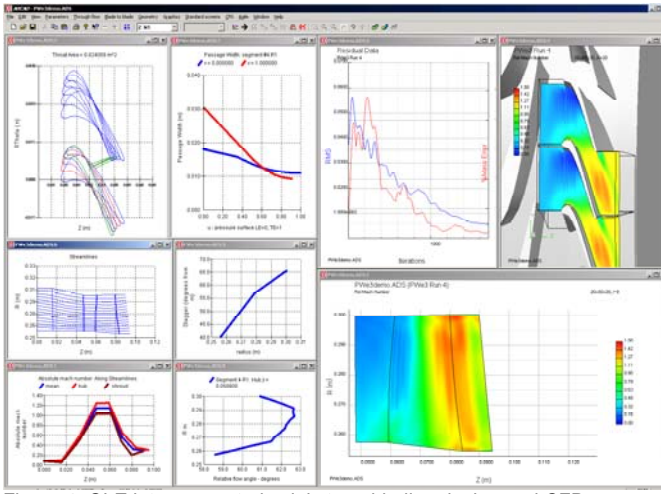

Figure 4. OLE interconnected axial stage blading design and CFD analysis.

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